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DRASTIC CHANGES IN MEDICAL FIELD BY THE INVENTION OF NANOBOTS

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Abstract-Nanorobot (nanobots, nanoids, nanites) is a small electromechanical device with an exterior made up of carbon atoms in a diamond shape is used to interact with nanoscale objects or manipulate with nanoscale resolution. Usually the size of these robots range from 500-3000nm. In surgery this is more accurate instead of using the human hand. Nanobots moves around their environment consuming molecules to attain energy. Nanobots direct themselves towards certain cells by their glycolipid structures. This idea would help physicians to treat diseases effectively without any adverse side-effects, actually the idea is to repair organs such as the brain, or the heart. The most valuable feature is that without any invasive surgery all of this can be done.

Keywords- *nanoscale, glycolipid, invasive,nanobots*

INTRODUCTION

- *What is Nanobot?*

Nanorobots are minute robots, similar to the size of molecules, and are used in the improvement of innovative treatments in medicine and other biological applications[3]. There are even possible applications in which nanorobots could be used to help, mend or repair damaged tissue within a person's body. Nanobots will find their first applications in medical science also known as nanomedibots.

- *Structure:*

They will have a diameter of about 0.5 to 3 microns and will be constructed out of parts with dimensions in the range of 1 to 100 nanometers. The main element used will be carbon in the form of diamond / fullerene nanocomposites because of the strength and chemical

inertness of these forms.Nanorobots, measure only about six atoms wide[8], so they are capable of building with the very particles of our bodies: atoms and molecules. It is anticipated that they could be equipped with all sorts of tools and cameras in order to furnish more extensive information about the human body. The ideal nanobothas not yet been fully comprehended, but when this microscopic robot makes its inevitable debut it will be hailed as a lifesaver by the world of medicine.

- *How do they Work?*

These bots are simply injected in to the body using a syringe. Surgeons will program these minuscule machines depending on the type of task that is needed to be done. There are theories that these bots have a two-way communication system one is through acoustic signals and through sound waves where the external source could reprogram the bots. In the body there could be other bots stationed and report results from the nanobots passing by. Once the task has finished the body can naturally flushed away like the rest of the body's waste.

Nanobots are deployed in to a person's body to apply treatments at the molecular level[1]. On the other hand, Pills could be swallowed which contain molecular robots that deliver medication directly to the area of injury or illness. Machines could be used to target harmful cells or viruses in a person's body and either destroy them or otherwise make them unable to damage a person.

CAPABILITIES:

Nanobots Go Where No Robot Has Gone Before. Surgery's associate risks are not only inherent in the cutting and sewing done by medical staff but include drug-related dangers as well[2]. Patients may be allergic to anesthetics; their organs may become infected from a variety of surgery-related sources; during an organ transplant their body may mysteriously reject the new organ, leading to death; and in the case of a tumor operation, even a few microscopic missed cells can constitute complete failure to battle the cancer[7]. To conquer these conditions we need an effective mechanism that is Nanobots. It is anticipated that they could be equipped with all sorts of tools and cameras in order to furnish more extensive information about the human body. The capabilities of nanobots include their function as:

- Replacement helper-T cells in a weakened immune system
- Ability to interact with materials in their most basic form may enable them to effectively rebuild or "re-grow" damaged tissue.
- Able to remove microscopic particles of cholesterol or cancer, and to rebuild

individual molecules to create a new tissue layer.

- In cases where a bone has been broken[2] (researchers have already created a "nanobone" which has all the properties of natural bone but is also much stronger and more flexible.)

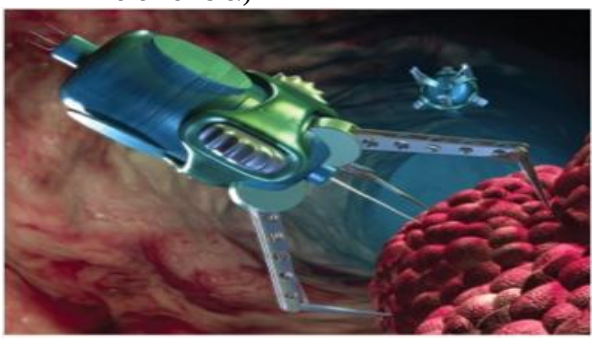

Fig- 1

- Eating away dead flesh at a wound siteto actually re-growing tissue so that it heals cleanly and quickly without leaving a nasty scar.
- Produce synthetic clotting material for their wound sites in order to stop the bleeding.
- Closing a split vein or a gash at the same time.

APPLICATIONS:

The circulatory system is a natural highway for nanomedibots and these will cruise through the blood stream to the area of distress, and are used to attach themselves to specific cells, such as cancer cells, and report the position and structure of these tissues[8]. Nanorobots may also be employed to detect specific chemicals or toxins and could give early warning of organ failure or tissue rejection. Researchers are in progress to develop or to produce light using nanobots (nanophotonics).The fields of Applications are

- To cure skin diseases, It could remove the right amount of dead skin, remove excess oils, add missing oils, apply the right amounts of natural moisturizing compounds, and even achieve the elusive goal of *'deep pore cleaning'* by actually reaching down into pores and cleaning them out[8].
- A mouthwash full of smart nanomachinesremoves pathogenic bacteria while allowing the harmless flora of the mouth to flourish in a healthy ecosystem.
- Medical nanodevices could augment the immune system by finding and disabling unwanted viruses. When an intruder is detected, it can be punctured, letting its contents spill out and ending its effectiveness.
- Devices working in the bloodstream could nibble away at arteriosclerotic deposits, widening the affected blood vessels. This would prevent most heart attacks.

CANCER DETECTION

Nanobots are machines that contain several viable bacteria containing all the required information for combating tumor cells, which are inadequate to defeat cancer. A flagellated non-pathogenic strain of bacterium E.coli carrying extraneous DNA sequence was used to establish communication between nanobots within the blood stream of cancer patients in a computer simulation. Single nanobot that swarm to the target tumor cells has to communicate to other nanobots in the vicinity[2]. It does so by releasing the correctly encoded bacteria that are attracted to the nutrients contained in other nanobots. A more promising tracking method is using an MRI machine to interact with their magnetic nature nanobots are becoming an optimistic type of treatment for cancer. Using an MRI to precisely place the nanomedibots in the cancerous region, the light causes the devices to heat to 131 degrees Fahrenheit which destroys the cancerous cells but doesn't damage surrounding tissues. In cell production, DNA leads **to** messenger RNA **(**mRNA**)** that carries off the instructions for making important proteins. Fire and Mello used particles called small interfering RNAs**,** orsiRNAs, to cut out unwanted pieces of the genetic code in the mRNA of their worm subjects. We can inject nanobots with siRNAs designed to cut out the genetic mutation for cancer in mRNA into the bloodstreams of cancer patients to detect the cancer or to avoid them forming proteins .

Nanobots laden with interfering RNA that deactivates the protein production of the cancer and kills the malignancy would attach themselves to the tumor and deliver the lethal.

GENE THERAPY

In gene therapy using just naked DNA is ineffective. DNA could be embedded into nanoparticles and moved to the desired place in the body and then inserted into cells. Normal DNA is often too large to pass through the cell membrane so special polymers can be used to compact the DNA and allow it to enter the cell. David M.Lynn's team has created a nanoscale film of water soluble polymers and DNA. The films can be coated onto medical devices such as a stent. A stent is used to widen and then support clogged up arteries but smooth muscle can often grow around the stent and make it useless. Coating the stent in this nanoscale film that has DNA with the gene that prevents the smooth muscle growth means the smooth muscle can't grow around the stent and the artery remains open[5].

A problem with gene therapy is that it hard to control the length of time the cells around the stent are exposed to the gene therapy.For thisDavid M.Lynn's team used many layers of DNA and the water soluble polymers. More layers would mean a longer exposure to the gene therapy and also layers of alternative polymers that take longer to degrade. This means that rather than all the ingredients being simultaneously released in the body, there is a 'soap effect' where the outer layers are slowly degraded away[5]. This 'soap effect' could be particularly useful when using different gene therapy treatments in one. Nanobots insert the DNA into the cells or help in identifying cells and make them highlight to other nanobots equipped for gene therapy. The genes in the cell could be changed slightly to support the addition of the man-made nano-scale materials to create the hybrid cell. The hybrid could then carry out some of functions of nanobot and maybe also enhance the inhabited cells' functions. Such as a T-Lymphocyte could be made to recognise cancer cells and then stimulate the production in hybrid B-Lymphocytes that produce the nanoparticles needed for gene therapy instead of antibodies. These hybrids would be most suitable with blood borne cells as they could exist in the blood and be able to get to any part of the body. They would have the added benefit of not being attacked by the body's immune system because the body would recognise them as their own cells. Stretching a supercoil of DNA between its lower pair of robot arms, the nanomachine gently pulls the unwound strand through an opening in its prow for analysis. Upper arms, meanwhile, detach regulatory proteins from the chain and place them in intake port. The molecular structures of both DNA and proteins are compared to information stored in the database of a larger nanocomputer positioned outside the nucleus and connected to the cell-repair ship by a communications link.

KIDNEYS TREATMENT

Kidney stones can be intensely painful the larger the stone the more difficult it is to pass. Doctors break up large kidney stones using ultrasonic frequencies, but it's not always effective. A nanorobot could break up a kidney stones using a small laser.Nanorobots might carry small ultrasonic signal generators to deliver frequencies directly to kidney stones.

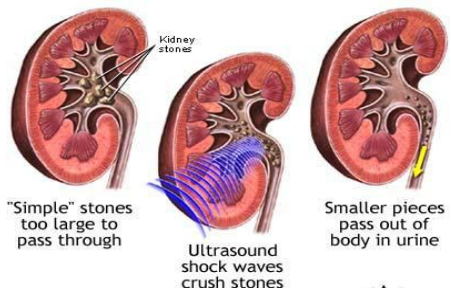

Fig-2

DETECTIONOF ATHEROSCLEROTICLESIONS:

Another significant possible feature of medical nanorobots will be the capability to locate atherosclerotic lesions in stenos blood vessels, particularly in the coronary circulation, and treat them either mechanically, chemically or pharmacologically[4]. Cardiovascular problems are generally correlated with the obesity, human sedentary lifestyle, or hereditary characteristics. Heart problem is the world biggest killer. The Nanorobot Control Design (NCD) is multithread software. It is comprised of collision detection and physically based simulation in addition to removing plaque from arterial walls, they could also be used to find areas of arterial weakness.

Nanorobots could be used to clear built-up cholesterol from your arteries, thereby saving you from a heart attack. If the heart itself is damaged, they work their way up to the affected area and perform micro-surgery that you would probably not feel or notice, but which would almost certainly save your life.

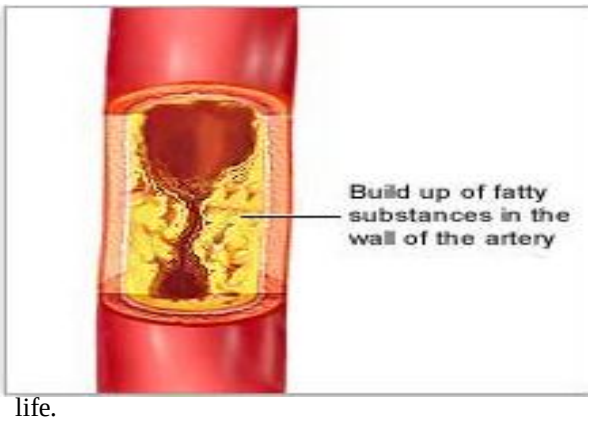

Fig - 3

CONCLUSION:

Nanobots are poised to bring the revolution in medical communitywhich will be the nonhazardous to the living kind.Scientists in the medical field are also predominantly excited about not only the healing nature of nanobots, but also their capacity for research and discovery inside the human body. Nanobots are used to monitor the traffic and better direct it, and alert them to any poisons or dangerous biological substances in our body and track their activitiesand also checks for physiological problems.Their ability to interact with other living systems increases because they can easily cross the skin, lung, and in some cases the blood/brain barriers.Nanobots extends their functionalities in almost all the sectors in today's world like Diagnostics, Drug delivery, Tissue engineering, Catalysis, Filtration, Aerospace, Construction, Refineries, Consumer goods etc.Since

nanorobotresearchers expect to have the first fully functioning prototype released to the public in the next 25 years, the day may soon come when we will have the magnificent experience of seeing ambiances of these Nano-machines.

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